

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

INTERIM STANDARD
LIVESTOCK SHADE STRUCTURE
(No.)

Code 717

DEFINITION

A permanent or portable, framed structure with a mesh fabric roof to provide shade for livestock.

PURPOSE

This practice may be applied as part of a grazing management system to provide shade areas for livestock, helping protect surface waters from pollution and the livestock from excessive heat.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to areas:

- (1) Where animal productivity and well being is adversely affected by heat generated from sunshine; or
- (2) Where livestock are excluded from natural shade along streambanks or other water courses.

CRITERIA

Federal, State, and Local Laws. All planned work will comply with all Federal, State, and local laws and regulations.

General. Livestock shade structures can be permanent or be made to be moveable with farm equipment. The structure(s) will be sized to meet the needs of the livestock operation but will not be less than the recommended shade requirement (see Table 1). The maximum size of an individual portable unit (shade frame) will be limited to 25 feet by 42 feet.

Orientation. If it is desirable for the area to be kept dry, the longest axis shall be oriented in a general north to south direction. This will permit a greater amount of sunshine to affect the total shaded area. If the animals are to be confined

under the structure, then an east to west orientation of the long axis is more desirable.

Protection. The top of the structure will be relatively flat so that strong winds will have minimum effect on the structure. A 1.0-foot pitch for the top of the structure is permissible to provide faster rain runoff from the roof.

Location. The structure will be located on a well-drained site, if possible, and as far as practicable but no less than 200 feet from any surface water, at least 150 feet from an up gradient well, and at least 300 feet from a down gradient well. If a well-drained site is not possible, a portable structure will be used. The structure will be located a minimum of 50 feet from any type structure that could be an obstruction to the circulation of air. Portable structures will be moved to new locations periodically to prevent destruction of vegetation in the immediate area. The structure will not be located in the general vicinity of a water source or mineral block in order to create a desired livestock-grazing pattern.

Locate portable shades in such a way to improve grazing distribution.

Locate shade structures in areas that are not prone to lightening strikes.

Materials. Planning, design, and construction will ensure the structure is sound and of durable materials commensurate with an anticipated life of 10 years.

Steel Structural Members. The main structural members will be constructed of 2 inches minimum, nominal diameter steel pipe meeting or-exceeding the requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.154 inch). Longitudinal members of the top frame will be constructed of 1¼ inches minimum nominal diameter steel pipe meeting or exceeding the

requirements of ASTM A-53 for Schedule 40 pipe (wall thickness of 0.140 inch). All structural members, welds and areas of damaged coatings will be galvanized or otherwise protected with a zinc dust-oxide coating. The protective coating of the pipe is not required if the pipe wall thickness exceeds the minimum wall thickness by at least 20 percent.

Vertical member spacing will not exceed 21 feet in the longitudinal direction and 15 feet in the traverse direction. The length of vertical members will not exceed 12 feet except that length may be increased to 13 feet to provide slope (pitch) to the top of structure. A minimum height of 7 feet will be provided for a swine shade structure.

Bracing will be provided at the junction of all structural members. The corners of the roof frame will be braced with a ¾-inch diameter steel bar, 1½ inches minimum steel pipe or other methods providing equivalent rigidity. At junctions of vertical members with roof frame and ground frame, knee braces of equivalent section will provide bracing to the main members, ¼-inch gusset plates or other methods providing equivalent rigidity. All welding will be continuous, professionally completed, and suitable for the material used.

Fabric. Mesh shade cloth will be constructed of high-quality polypropylene fabric or similar materials and will be recommended by the manufacturer to be suitable for this use. The cloth will provide at least an 80% shade level and be made with ultraviolet light (UV) protective materials. The edges of the fabric will be taped and/or sewn to not unravel and grommets will be installed on the edges of the cloth at maximum intervals of 2 feet.

The shade cloth will be adequately secured to the shade cloth frame with UV protected polypropylene rope or other equivalent methods so as to provide adequate and even tension on the fabric in accordance with the manufacturer's recommendations.

Damaged shade cloths will be replaced as needed.

CONSIDERATIONS

The minimum shade requirement for livestock is shown in Table 1:

Table 1- Minimum shade requirement.

Animal Type	Shade Requirement (ft ² /hd)
400 pound calves	23
800 pound feeders	32
Beef cows	40
Dairy cows	50
Mature swine	20

The manufacturer typically warrants the cloth for at least 5 years. Replacement of the cloth may be necessary during the life of the structure.

Loose flapping cloths will discourage cattle from using the portable shade.

Place cattle fly rubs in the vicinity of the portable shades to increase their use.

Tie-down of portable structures at the four corners is recommended for protection.

Removal and storage during the winter months can extend the life of the shade cloth.

Consider the use of fabric designed to allow wind to easily pass through the fabric while still providing shade.

Construct the bottom of portable structures with skids to make relocation easier.

Consider applying NRCS Conservation Practice Standard *Heavy Use Area Protection (Code 561)*, where vegetation cannot be maintained underneath the shade structure.

Shade structures will have a minimal or no affect on the water budget.

The shade structure should have an overall positive impact on water quality by reducing the cattle loafing times in riparian areas.

Due consideration should be given to economics, the overall waste management system plan, and safety and health factors.

PLANS AND SPECIFICATIONS

Plans and specifications for livestock shade structure will be in keeping with this standard and will describe the requirements for applying the practice to achieve its intended purposes. Plans and specifications will include construction plans, drawings, job sheets or other similar documents. These documents will specify the requirements for installing the practice, including the kind, dimensions, amount, material coatings, and quality of materials to be used.

OPERATION AND MAINTENANCE

Shade cloth should always be kept tight so that it will not be damaged by wind.

Replace the cloth when it has deteriorated due to environmental conditions.

Maintenance coatings may need to be replaced on the structural steel components.

Portable structures should be moved periodically to prevent destruction of vegetation in the immediate area.

The shade cloth should be removed and stored in a protected area during winter.

REFERENCES

Shade for Grazing Cattle, Department of Biosystems and Agricultural Engineering, Cooperative Extension Service, College of Agriculture, University of Kentucky, by Larry Turner.

Virginia Field Office Technical Guide (E-FOTG), Section IV.

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer."

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS

LIVESTOCK SHADE STRUCTURE

(No.)
CODE 717

Livestock Shade Structure. This specification covers the materials and installation of livestock shade structures.

Structural materials. Structural members will meet the requirements of Virginia Conservation Practice Standard *Livestock Shade Structure, Code 717*.

Fabric. Fabric will meet the requirements in conservation practice standard Livestock Shade Structure, Code 717. Fabric will be constructed of high quality materials and will be recommended by the manufacturer to be suitable for this use. The mesh fabric will provide at least 80 percent shade.

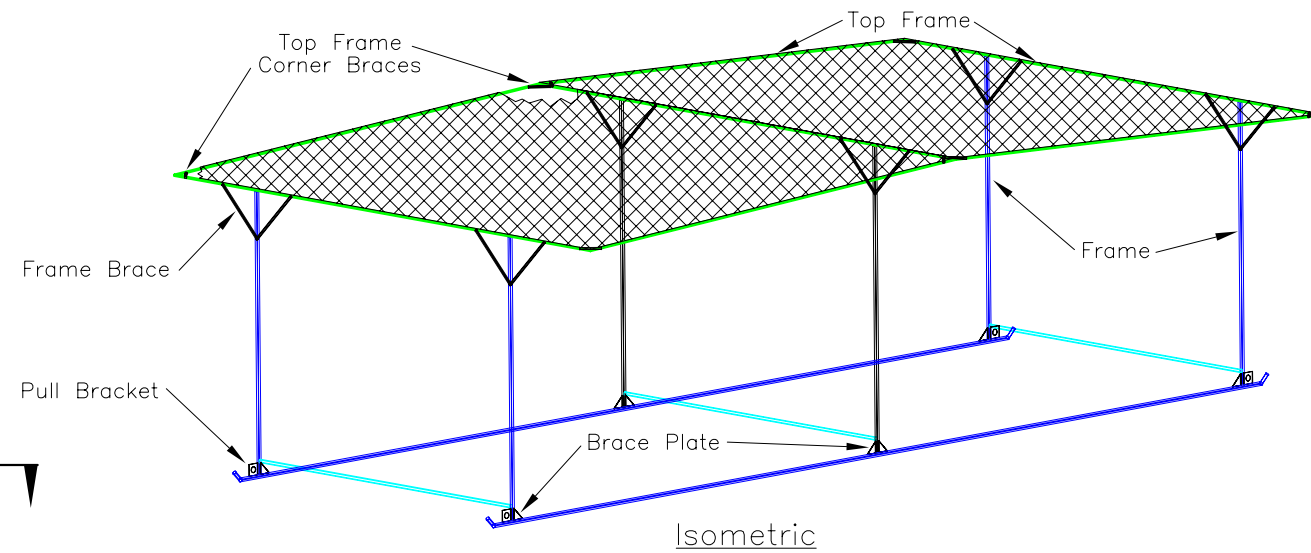
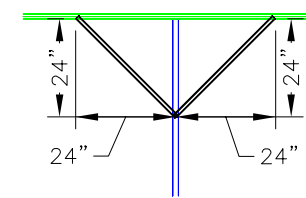
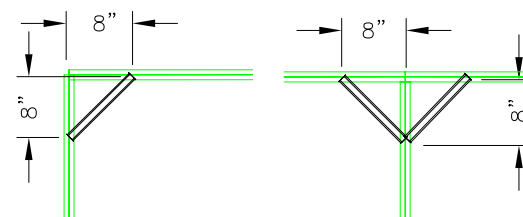
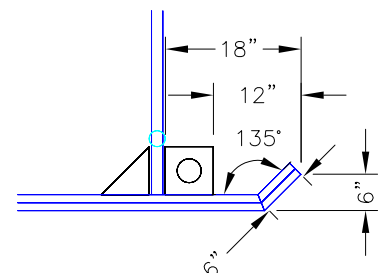
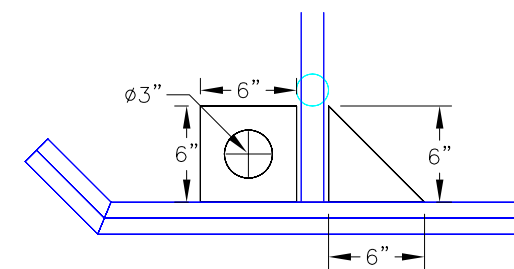
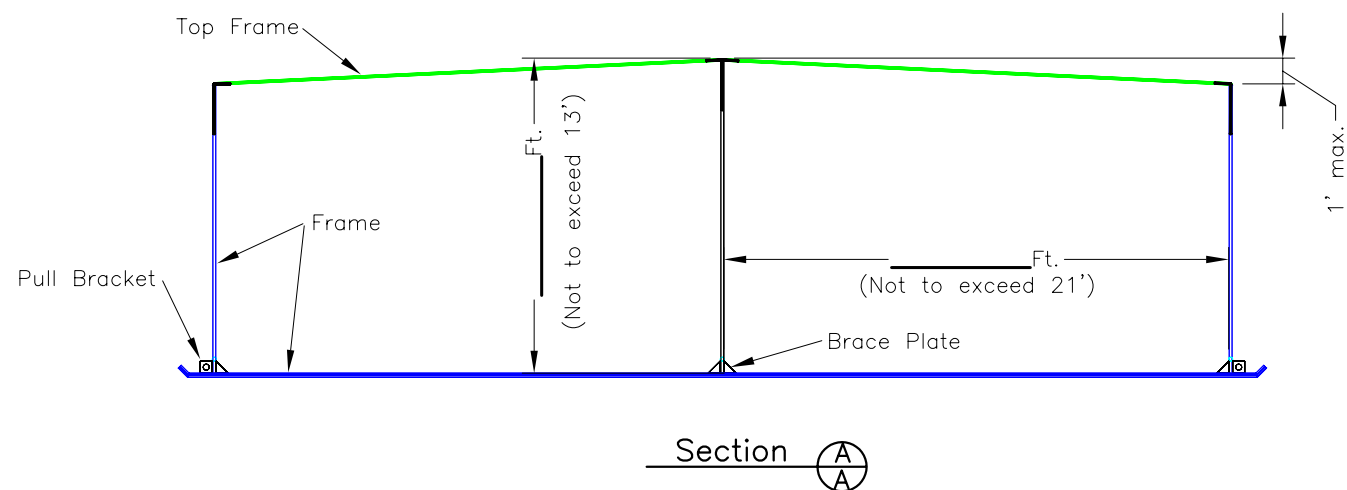
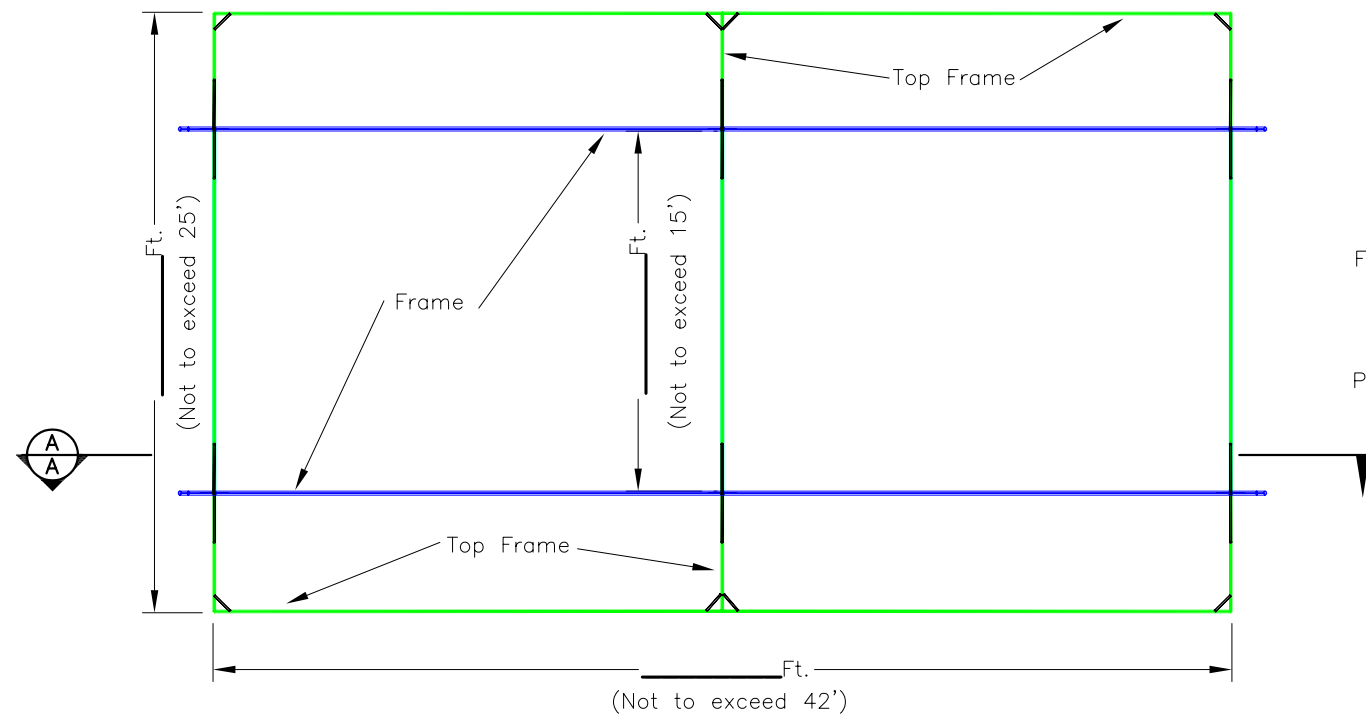
The shade cloth will be adequately secured to the shade cloth frame with ultraviolet light (UV) protected polypropylene rope or other equivalent methods so as to provide adequate and even tension on the fabric in accordance with the manufacturer's recommendations.

Shop Fabrication. Shop fabrication of structural elements may be performed for easy

field assembly in lieu of welding. All such fabrication will permit assembly of the structure to have strength equal to that of a continuously welded structure. All such fabricated-members will be joined by no less than two $\frac{1}{2}$ -inch machine bolts with connecting members being no less than double pipe thickness or $\frac{3}{8}$ -inch steel plate. The designer will approve plans for such fabrication.

Variations. Planned variations from the above materials and installation specifications must be approved before construction by the responsible designer, provided it is determined that such variations will result in an installation that will meet or exceed one installed in accordance with the above specifications. These variations will be documented and recorded on the design.

Construction Tolerance. Structural dimensions and materials used will be documented in writing. Minor construction tolerances may be accepted by the person responsible for approving the construction.



- Note:
1. Maximum allowable dimensions are noted in parenthesis. Planned dimensions are inserted in the blank spaces.
 2. The frame is to be constructed of 2" dia. pipe or greater and the top frame is to be constructed of 1 1/4" dia. pipe or greater.
 3. Pipe material shall meet or exceed ASTM A-53 for schedule 40 steel pipe.
 4. Brace plates and pull brackets are to be constructed of 1/4" plate steel or thicker and are to be welded to the frame on both sides of the plate.
 5. All welds are to go completely around the member being welded.
 6. Either 1 1/4" dia. galvanized pipe or 3/4" dia. steel bar may be used for the corner braces for the top frame.
 7. All structural members, welds and areas with damaged coatings shall be galvanized or otherwise protected with a zinc dust-oxide coating.
 8. Mesh shade cloth shall provide at least 80% shade level and be made with UV protective materials.